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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/363,523 | 07/29/1999 | RAJARAO JAMMY | 99-P-7722-US (8055-98) | 8231 |

7590 06/28/2004
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| EXAMINER |
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ESTRADA, MICHELLE

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| ART UNIT | PAPER NUMBER |
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2823

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/363,523

Applicant(s)

JAMMY ET AL.

Examiner

Michelle Estrada

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 10-16 and 21-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-16 is/are allowed.
- 6) ☒ Claim(s) 1-8 and 21-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 and 21-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Wallace et al. (6,277,681) and Schrems et al. (6,018,174).

Wallace et al. disclose providing a crystalline silicon substrate (1) with an exposed precleaned surface; removing a native oxide from the exposed surface; (Col. 2, lines 20-24); and exposing the exposed surface to nitrogen to grow a continuous crystalline silicon nitride layer (3) (Col. 3, lines 55-59); wherein the step of removing includes the step of employing a hydrogen fluoride wet clean process to remove native oxide from the exposed surface; wherein the nitrogen precursor is ammonia; wherein the step of introducing ammonia is done at a temperature of 900 °C which overlaps the temperature recited in claim 7 and 27; wherein introducing ammonia is done under a pressure of 10^{-6} Torr which overlaps the pressure recited in claim 8.

Wallace et al. do not disclose precleaning the exposed surface by employing a hydrogen prebake; wherein the hydrogen prebake is done under a temperature between about 400 and about 1300 °C; wherein the hydrogen prebake is done under a pressure of about 10^{-9} Torr and about 600 Torr; a duration of delay between the cleaning steps.

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Schrems et al. disclose precleaning the exposed surface by employing a hydrogen prebake; wherein the hydrogen prebake is done under a temperature of 900 °C which overlaps the temperature range of claim 4 and 24; wherein the hydrogen prebake is done under a pressure of about 20 Torr which overlaps the pressure range of claim 5 and 25; and making the capacitor in a trench.

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Wallace et al. and Schrems et al. to enable the precleaning step of Wallace et al. to be performed according to the teachings of Schrems et al. because one of ordinary skill in the art would have been motivated to look to alternative suitable methods of performing the disclosed precleaning step of Wallace et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

The duration of delay between the cleaning steps would have been a matter of routine optimization. It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a certain time of delay, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In addition, the selection of a certain time delay, temperature range and pressure range, its obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve

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unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed time delay, temperature range and pressure range or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen time delay or upon another variable recited in a claim, the Applicant must show that the chosen time delay is critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Allowable Subject Matter

Claims 10-16 are allowed.

The following is an examiner's statement of reasons for allowance: there is no disclosure in the prior art of depositing an amorphous silicon nitride layer over the continuous crystalline silicon nitride layer to form a node dielectric.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that the delay of time is not a matter of routine optimization, rather, the time delay determines the type of layer to be formed. However, the time

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delay claimed is done after the removing step and before the precleaning step. It does not have anything to do with the type of layer formed.

Applicant argues that the process of the combination does not disclose the step of removing the native oxide, the delay of time and the hydrogen prebake. However, the first portion of the prebake would remove the native oxide, the end portion would be a hydrogen prebake and the portion after removing the native oxide would be a delay of time. Applicant does not require particular conditions during the delay of time, but instead labels the native oxide removal step of the combination as 3 steps.

Applicant argues that Schrems discloses the use of hydrogen prebake to remove a native oxide prior to formation of an epitaxial silicon layer. However, the additional teachings of Schrems does not negate the teachings relied on of removing a native oxide.

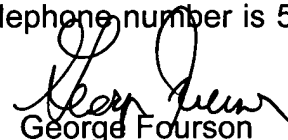
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 571-272-1858. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2800.



MEstrada
June 25, 2004



George Fourson
Primary Examiner
Art Unit 2823